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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|----------------------------|-------------|----------------------|-------------------------|------------------|
| 10/825,138 | 04/16/2004 | Michael Owen Whiting | 2993-520US RM/JR/as | 7974 |
| 32292 | 7590 | 12/23/2005 | EXAMINER | |
| OGILVY RENAULT LLP (PWC) | | | KIM, TAE JUN | |
| 1981 MCGILL COLLEGE AVENUE | | | ART UNIT | |
| SUITE 1600 | | | PAPER NUMBER | |
| MONTREAL, QC H3A 2Y3 | | | 3746 | |
| CANADA | | | DATE MAILED: 12/23/2005 | |

Please find below and/or attached an Office communication concerning this application or proceeding.

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|------------------------------|------------------------|-----------------------|--|
| Office Action Summary | Application No. | Applicant(s) | |
| | 10/825,138 | WHITING, MICHAEL OWEN | |
| | Examiner | Art Unit | |
| | Ted Kim | 3746 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-22 is/are pending in the application.
4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 13-19 is/are allowed.
- 6) ☒ Claim(s) 1,2,5,6,8,9,12 and 20-22 is/are rejected.
- 7) ☒ Claim(s) 3,4,7,10 and 11 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 04/16/2004.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: ____.

DETAILED ACTION

Specification

1. The disclosure is objected to because of the following informalities: element 34 in paragraph 15 is used to designate the “power plant compressor” as well as the “cone” in paragraph 17.

Appropriate correction is required.

Claim Objections

2. Claim 12 is objected to because of the following informalities: claim 12, “the gas turbine engine” lacks antecedent basis and “an auxiliary power unit” already has antecedent basis and should be appropriately amended with ~~the~~ or ~~said~~.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 20-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Steiner (5,987,877) in view of Whiteman et al (2,487,842) and Rud et al (4,999,994). Steiner teaches a method for cooling a gas turbine engine, the method comprising the steps of: rotating a turbine section of the gas turbine engine such as to drive a rotating

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shaft; flowing oil lubricating parts of the gas turbine engine through an oil cooler 5; driving an auxiliary compressor 11 with the rotating shaft. Whiteman et al teach an oil cooler 40 is used to cool the oil from the turbine (from line 41, 42, 44). It would have been obvious to one of ordinary skill in the art to use the oil cooler to cool the oil from at least the turbine as a significant component that requires oil lubrication and cooling. Steiner does not teach the auxiliary compressor being located downstream of the turbine section. Rud et al teach an impeller 5 which is located downstream of the oil cooler 7. It would have been obvious to one of ordinary skill in the art to place the impeller 5 downstream of the oil cooler. Modification of Steiner (Fig. 1 or 2) to incorporate this feature will result in the impeller being downstream of the oil cooler and thus downstream of the turbine 2. ~~Note that the turbine is shown as the divergent section of the engine.~~ *Also taught by the prior art is* generating a pressure differential between opposed sides of the oil cooler with the compressor; inducing a cooling air flow through the oil cooler with the pressure differential; and cooling the oil within the oil cooler with the cooling air flow, thereby cooling the gas turbine engine. Steiner teaches ~~the step of cooling external of the gas turbine engine with the cooling air flow 8 before the cooling air flow goes through the oil cooler 5; discharging the cooling air flow 10 via an exhaust opening of the gas turbine engine 12 the exhaust opening also discharging an exhaust flow of the turbine section of the gas turbine engine 2.~~

5. Claims 1, 2, 5, 6, 8, 9, 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sheoran et al (5,265,408). Sheoran et al teach a forced air cooling system for an APU (in the background of the invention)

“(6) During the operation of the APU, heat is rejected into the compartment from numerous sources including the engine skin, exhaust gases, and tailpipe, as well as the engine oil cooler, generator, and other compartment accessories. To prevent the temperature in the compartment from reaching unacceptable levels, a ventilating or cooling airflow must be provided through the compartment.

(7) To remove this heat *an axial, vane type fan, driven off the APU gearbox*, is usually provided to pump cooling air past the *oil cooler* as well through the compartment. However, because of their multiplicity of high speed, rotating parts, these fans are susceptible to mechanical failures, which when they occur require that the aircraft be removed from operation. Further, these fans sometimes leak oil into the cooling flow which then covers the oil cooler fins resulting in reduced heat transfer and the possibility of an APU automatic shutdown because of excessive oil temperature. Also, as the oil cooler gets covered by this oil the flow of cooling air is blocked, backpressuring the fan and causing it to operate in a rotating stall which results in increased fan noise. Another disadvantage associated with fan cooler is that they increase the drag or load on the engine and therefore make starting the APU at the cold ambient temperatures encountered at high altitudes more difficult.

(8) In addition to fans sometimes a simple eductor having a conic nozzle is added to the cooling system. This eductor utilizes the kinetic energy of the APU exhaust gas to entrain cooling flow through the compartment. Generally, these eductors are not capable of pumping sufficient air flow to cool an oil cooler, and are only used to provide tailpipe or compartment cooling. Further, because of the low air density at altitude, to generate sufficient cooling flow the area of the conic nozzle must be significantly closed down which produces a substantial backpressure of the APU and consequent loss of power. Another disadvantage with these eductors is that when surge bleed flow from the APU's compressor is dumped in the vicinity of the eductor, the eductor's effectiveness is reduced.”

housed within a compartment, the forced air cooling system comprising: at least one inlet opening (inherent) for providing air to an oil cooler; an exhaust opening (inherent) in the compartment; the oil cooler being located in the compartment; a plenum in fluid communication with the exhaust opening and with the oil cooler; the rotating compressor

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induces a cooling air flow through the oil cooler. Also note that the features of the improvement of Sheoran et al shown in Fig. 1 can be utilized to teach the general structure of the APU with the cooling passages. Sheoran et al do not teach that the compressor rotated by a rotating shaft of the APU such that the compressor and rotating shaft rotate at a same speed. Rud et al teach a compressor 5 (centrifugal Fig. 1, axial Fig. 2) drawing air through the oil cooler 7 and driven directly by the turbine (see abstract, last line) and thus at the same speed. It would have been obvious to one of ordinary skill in the art to drive the impeller directly from the APU turbine shaft to simplify connections and/or reduce the weight of the gearbox.

Allowable Subject Matter

6. Claims 3, 4, 7, 10, 11 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

7. Claims 13-19 are allowed.

Contact Information

Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Ted Kim whose telephone number is 571-272-4829. The Examiner can be reached on regular business hours before 5:00 pm, Monday to Thursday and every other Friday.

The fax numbers for the organization where this application is assigned are
571-273-8300 for Regular faxes and 571-273-8300 for After Final faxes.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's
supervisor, Timothy Thorpe, can be reached at 571-272-4444.

Any inquiry of a general nature or relating to the status of this application or proceeding
should be directed to the receptionist of Technology Center 3700, whose telephone
number is 703-308-0861. General inquiries can also be directed to the Patents Assistance
Center whose telephone number is 800-786-9199. Furthermore, a variety of online
resources are available at <http://www.uspto.gov/main/patents.htm>



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